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NOTES ON THE MAMMALS OF THE LAKE MAXINKUCKEE REGION.[1]

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While engaged in a biological survey of Lake Maxinkuckee, Indiana, under the direction of the Honorable George M. Bowers, U. S. Commissioner of Fisheries, we took occasion to observe the various species of mammals occurring in that region and to make notes concerning their abundance and habits. Special attention was paid to those species such as the muskrat, mink and raccoon, whose habits relate them ecologically to the fishes and other life of the lake. Many observations were made and noted, however, regarding other species. These observations seem worth putting on record and this we have endeavored to do in the present paper.

Lake Maxinkuckee is a small glacial lake in the southwest corner of Marshall County, Indiana. It is on the Terre Haute and Logansport Railroad (Vandalia Line), 34 miles south of South Bend, Ind., 94 miles southeast of Chicago, and 149 miles north of Terre Haute.

The lake is about $2\frac{3}{4}$ miles long and about $1\frac{1}{2}$ miles wide. The total area of the lake is 1854 acres. The greatest depth is 89 feet, and most of the lake is more than 25 feet deep.

The country surrounding the lake lies wholly in the glacial region of Indiana. The topographic features are somewhat varied. There are numerous small hills with gentle slopes, and among them

[1] Published by permission of the Honorable George M. Bowers, United States Commissioner of Fisheries.

are a good many kettle-holes, some of considerable depth, and with more or less water during wet seasons, while others are less deep and usually dry. These kettle holes usually support a more or less rank growth of vegetation consisting of grasses, sedges, bushes and small trees, forming thickets very attractive to certain mammals. The highest land anywhere about the lake is on the east side where it rises 136 feet above the lake surface. There is about the lake a good deal of marsh land; the most considerable areas being that about Norris Inlet at the south end and that on the west side surrounding Lost Lake and extending southward from it along its outlet. Lost Lake is a small lake a few rods west of Lake Maxinkuckee; it is in fact an expansion of the Maxinkuckee outlet. Between the two lakes and bordering the outlet is Green's marsh which consists of several acres of wet land. Just south of this is Green's woods, an open woodland with little underbrush, where certain animals are apt to be found. On the west side of the railroad and facing it at the southwest corner of the lake is a large gravel pit and with high bank on the west which is a favorite place for the striped gophers. Southwest of this, a short distance, is Walley's woods the largest and most virgin forest near the lake. At the south end of the lake is Farrar's woods, smaller and less dense, but with heavy underbrush. East of the north end of the lake is a considerable acreage of open forest of large trees where raccoons, squirrels and other arboreal species occur.

In the following list of species we have followed the nomenclature and sequence of Dr Hahn's recent paper on mammals of Indiana.[1]

List of Species.

1. Didelphis virginiana Kerr.

Common Opossum.

According to old settlers the Opossum used to be common as far north as northern Indiana, but disappeared from there many years ago. In recent years they have been returning northward

[1] The Mammals of Indiana, 33d Annual Report, Department of Geology and Natural History of Indiana, 1908, pp. 417–663.

and are now tolerably common throughout the northern part of the state. About 1887 an old trapper near Fort Wayne caught one and reported that it was the first he had seen for 20 years. No more were seen in that region until about 1900, when they began to be captured occasionally. In October, 1903, three were captured in Walley's woods southwest of Lake Maxinkuckee and three others were trapped at Norris Inlet. It was not seen by us at the lake until the summer of 1906, when on August 5, an adult example was found dead on the lake shore just north of the Outlet. On October 30, 1906, another was seen in the possession of a boy at Culver, who reported the capture of 3 on the previous night. One is reported to have stayed under the Barr Cottage on Long Point during the winter of 1906–7. About September 3, 1907, boys living in Culver got an old Opossum with a number of young in her pouch. They did not count the young, but let her go.

The northward movement of the Opossum seems to have been general over the state. They are occasionally taken in Marshall and adjoining counties. They are frequently seen at Fort Wayne, Indiana, a few being captured every winter. Mr. J. J. Hildebrandt, of Logansport, reported that some one had brought him about October 1, 1904, an old Opossum and 12 young, the latter about two-thirds as large as rats. The first night she killed 9 of them. He kept the other three and the mother for about 3 weeks, when he took them to the woods and turned them loose.

Devouring its young in captivity seems to be a common habit of the Opossum, and almost everyone who has tried to keep them together has had the young destroyed by the mother.

The Opossum is usually caught in this region for its fur. The prices now obtained by the trappers are 15 to 25 cents. The pelts are becoming more valuable every year, the prices brought in the London market in 1910 for prime skins ranging from 45 cents to $1.

The food of the Opossum is chiefly insects, though they are also fond of pawpaws. They also feed to some extent upon the mussels which they find in the lake. They are an innocent, harmless animal and should be protected.

2. Cervus canadensis (Erxleben).
Elk.

Remains of the Elk, especially the horns, are still occasionally found in the peaty bogs in Marshall county, and attest the former presence of this animal in the vicinity of the lake. They evidently disappeared sometime before the deer. The antiseptic nature of the peat has preserved these remains much longer than elsewhere, so that the evidence of the animal's former occurrence remains much longer in regions where there are peat-bogs than in other places. Mr. S. S. Chadwick has in his possession part of an elk-horn 3 inches across at the base and 22 inches long, found in low ground a few miles southeast of the lake about 1904.

3. Odocoileus virginianus (Boddært).
Virginia Deer.

Formerly Deer were common throughout Indiana but none has been seen in recent years. Occasionally a deer is reported from the Kankakee region west of Maxinkuckee but none of these reports has been authenticated. It is said that one was killed in Jasper county in 1890 and one seen in Newton county in 1891.[1]

4. Sciurus carolinensis leucotis Gapper.
Gray Squirrel.

Formerly the Gray Squirrel was very abundant throughout Indiana and southern Michigan. Forty to fifty years ago squirrel hunting was an avocation in which nearly every farmer and farmer's son, as well as many of those who dwelt in the villages and towns engaged, and a poor marksman indeed was he who did not return from a morning in the woods with the old muzzle-loader and anywhere from 6 to 20 squirrels. To be regarded as a real expert shot, however, it was necessary to be able to "bark" the squirrel, that is, to kill it simply by shooting through the bark of the limb on

[1] Butler, Proc. Ind. Acad. Sci. 1894, p. 83.

which the squirrel happened to be sitting without actually hitting the squirrel. There were in every community a number of such expert squirrel hunters. In southern Michigan a large proportion of the Gray Squirrels were *black!* while in middle Indiana a black squirrel was not often seen. In the Maxinkuckee region this squirrel is now a very rare species. Mr. Chadwick says he knows of only 2 or 3 having been killed near the lake in the last 6 or 7 years. The only one ever seen by us in that region was observed May 9, 1901.

5. Sciurus niger rufiventer E. Geoffroy.

Fox Squirrel.

Although formerly quite common in central and northern Indiana, the Fox Squirrel was never so abundant as was the Gray Squirrel when the country was new. But as the forests were cleared away, farms opened up, and open woodlands and pasture lots became more and more common features of the country, the Gray Squirrel became practically extinct while the Fox Squirrel was more nearly able to hold its own, albeit, even this species is far from being as abundant as formerly. In the region with which the present paper deals the Fox Squirrel was very rare until recently. None was seen or heard of in 1899. In 1900 one was seen in Walley's woods on September 28, and one near Delong the next day. The first of these was killed by some one in October. Several were killed by a local hunter in the fall of 1902. In 1904, Fox Squirrels were occasionally seen. Two were killed November 29; one was seen in the Assembly Grounds; on December 15 a large oak on Long Point was cut down and was found to contain 2 Fox Squirrels, probably young of the year, but fully grown. In the fall of 1905 3 or 4 were seen on Long Point. In 1906 two were killed south of the lake September 12, two days later one was seen in Farrar's woods, and on September 17 another was noted on the east side of the lake. In the autumn of 1907 one or more were observed in Green's woods. Doubtless it is no less frequent in the open woods east of the lake.

The Fox Squirrel prefers the open woods and is rarely seen in heavy, dense forests. Wherever there are a few large old trees with

hollow limbs or trunks on the borders of cornfields there these squirrels are apt to take up their homes if there be any in the neighborhood. Unless disturbed the same pair will occupy the same tree for several years, probably until they die or are killed.

These squirrels feed upon all sorts of nuts and are very destructive to the farmer's corn. In January, 1908, Mr. A. M. Evermann observed Fox Squirrels near Burlington (56 miles south of Maxinkuckee) feeding upon the seeds of the cocklebur, *Xanthium strumarium*. The squirrels would strip the burs from the plants and carry them to a nearby log on which they would sit on their haunches while they gnawed the burs and removed the seeds. At the time the ground was covered with snow.

So far as we have been able to learn this habit of the Fox Squirrel had not been previously observed.

6. Sciurus hudsonius loquax Bangs.

Red Squirrel.

The Red Squirrel, Pine Squirrel, Chickaree or Boomer, as it is variously called, is a northern species which is gradually extending its range southward in Indiana. Until within the last decade it was rare or wholly unknown in most parts of the state south of Logansport, though it was not uncommon in the more northern counties. On December 24, 1889, one was shot near Kewanna which is about 12 miles south of Maxinkuckee. It was regarded as a rarity in that region. About 1900 one was seen near Frankfort, about 70 miles south of Maxinkuckee, the first ever noted in that county. We have learned from Mr. Sidney T. Sterling of Flora, Carroll County, that it has recently appeared in that county.

When we began our investigations at Lake Maxinkuckee, the Red Squirrel was not common. In 1899 only one was seen, in September, near Lake Manitou. On September 24, 1900, a young one, just able to crawl about, was found on the ground in Farrar's woods. It had probably fallen from the nest. It was taken home and fed and soon became quite tame. It was not caged by us but was permitted to run about the room, and soon became quite playful and mischievous. One of its favorite positions was a seat on one's shoulder where it soon called attention to itself by a gentle

nipping of the ear of the person on whose shoulder it was sitting. One or more were seen October 1, 14, 19, and 30. In 1904, they were more numerous; several were noted October 19 and 27 and at various times thereafter until January 3, 1905, when we left the lake, until August, 1906, from which month until October 31, several were seen.

On September 13, 1907, and at various times thereafter until the middle of November, one or more were seen on any day when we cared to look for them. According to Mr. S. S. Chadwick they have continued to increase up to the present time. Their favorite haunts about Lake Maxinkuckee are the heavier woodlands at the south end of the lake, Walley's woods, the timbered areas on the east side and the groves north and east of the Academy grounds. Only rarely have we seen it on Long Point, while on several occasions we have observed it on the Tippecanoe River near Delong.

While the Red Squirrel is a merry playful little animal, there is little else to commend it to one's favor. While its principal food consists of nuts and seeds of various kinds it is very destructive to birds' eggs and even young birds. It is also popularly thought to drive the fox squirrel out of regions which it formerly occupied, and there is probably a basis of fact in this belief. On account of its small size it is not much hunted for food, although it makes a very delicious stew.

7. Tamias striatus (Linnæus).

Ground Squirrel.

The Ground Squirrel or Chipmunk is an interesting and familiar little animal in all suitable situations in Indiana. Every farmer's boy in the state knows it well. Wherever there are open woods or pastures and old decaying trees, rocky ledges overgrown with vines, fallen timber and brush piles, and Virginia rail fences that have not been well kept, there the Chipmunk is quite sure to be found. Though still abundant in most parts of Indiana they are less so than formerly. At one time they were so numerous as to be regarded as a serious pest and bounties were paid for their scalps.

About Maxinkuckee they are still rather common and may be seen almost anywhere about the lake and on adjoining farms.

Nearly all portions of the lake shore are favorable. Wherever there are old trees on the north, east and south sides, there you may find Chipmunk families. The old oaks at the southwest corner of the lake and those on Long Point have never, since our acquaintance with the lake, been without their Ground Squirrels. The open woods between the two lakes and Walley's woods are also favorite situations. A visit to any of these regions would almost certainly be rewarded by a glimpse of a pair or more of these merry creatures.

On Long Point several pairs usually have their homes, and from May or June until late in October they may be seen chasing each other along the fences or sitting at the root of some hollow old oak where they often remain chirping hours at a time. During the winter of 1900–1901, one had its home under the cottage in which we lived. During the fall it was seen daily gathering nuts, seeds, and grain which it stored for winter use. On bright sunny days it worked persistently from early morning until evening, usually stopping in the middle of the forenoon and again about two o'clock in the afternoon to sit on the south steps of the cottage or at the root of a gnarled old oak near by, where it would keep up an almost incessant chirping for an hour or more. Toward evening it generally disappeared, not to be seen again until 7 or 8 o'clock next morning. On dark and gloomy days it sometimes failed to appear. On November 27 it went into winter quarters and was not seen again until the twentieth of March following when it was seen scurrying about as lively as ever. From that date on it and others were noted occasionally on bright sunny days until warm weather, when they might be seen every day, usually near the edge of their burrows or other safe refuge into which they would scamper, on the slightest alarm, with a rapid succession of sharp chipping noises. During the summer and early fall they are ever in evidence and are not easily frightened. As fall comes on and seeds and nuts mature, these interesting little animals become more active and very busy laying up their winter stores, stopping now and then to bask in the sun, their crammed cheek-pouches giving them a comical, mump-like appearance. At this time of the year they have a call or note quite different from the sharp chipping noise usually heard in the summer, it being a succession of hollow clucking sounds, most interesting when heard at some distance through the autumn

woods. A little later, toward the last of October, when frosts are frequent and the days are chill, they may be seen only on those days that are bright and sunny, usually sitting in the sun on the root of some old hollow tree, chipping merrily. Still later, as cold days become the rule, only the brightest days tempt them out; then they sit quietly where the sun shines warmest, chipping not at all or only now and then very mildly.

Following are some of our notebook records:

1899.—October 3, still out and busy gathering food. 1900.—October 18 and 19, noisy about and under our cottage; October 22, noted; 24th, one seen going under cottage; 25th, the one belonging to our cottage was quite noisy for a while; 26th, 27th and 30th, still out and noisy; November 3, 5, and 6, seen; 27th, seen for last time. 1901.—March 20, the one under our cottage came out today and scurried about as lively as ever. October 19–21, very common on Long Point. At least 20 between our cottage and the end of Long Point, all very busy garnering their winter stores, but mixing a good deal of play with their work. 1902.—June 19, two seen on Long Point; 22d, one at tip of Point and several elsewhere. 1904.—October 18, several seen; 19th, on early morning trip around the lake saw only one; November 5, one seen. 1906.—September 17, several seen on east side; October 5, a few seen; 14th, a great many seen on east side, all chipping merrily; 25th, caught one in trap on Long Point; 30th, a very bright colored one seen. 1907.—September 26, one heard and another seen on east side; 29th, one heard at Walley's birch swamp; October 4, one seen on Long Point filling its pouches with ragweed seeds which it skillfully gleaned from the standing weeds; 10th, one seen on Arlington coal bin, and another with very full pouches basking on a rock near the Duenweg cottage. Loud gun shots fired at coots near by did not frighten it; 14th, one heard chucking near the birch swamp.

In some sections of its habitat the Chipmunk is said to be migratory, but our observations lead us to believe it to be non-migratory in Indiana.

The Chipmunk feeds chiefly upon nuts and seeds of various kinds. In regions where beech trees are found their delicious nuts constitute its principal food. Hickory nuts, particularly the thinner shelled species, hazelnuts, acorns and corn are also highly prized.

In the spring they may do some damage to the corn fields by digging up the newly planted grains; but this is infrequent and apt to occur only when the field borders an open woods. As already recorded, on October 4, we observed a Chipmunk going from one ragweed to another, stripping off the seeds and cramming his pouches with them; from which it appears that they are of some value as weed-seed destroyers.

On the whole, the Chipmunk is a harmless and very cheery little creature which, in moderate numbers, does little or no harm and adds much to the attractiveness of any region.

8. Citellus tridecemlineatus (Mitchill).

Striped Gopher.

This gopher is an intrusion from the prairie fauna to the westward of Maxinkuckee. It appears to be gradually extending its range eastward. Thirty years ago it was very rare or entirely unknown in Indiana except in the prairie counties along the western border of the state. During 1883–1885 the senior writer of this report had exceptional opportunities to become quite familiar with all parts of Carroll County, which lies some 50 to 80 miles south and a few miles west of Maxinkuckee, and in those years he saw a total of only 3 or 4 pairs of Striped Gophers within its borders and they were all in the extreme western part of the county where the land is largely prairie. During many years of almost continuous residence in that county (1858 to 1885) the species was never seen east of the Wabash River, but recently it is said to have appeared there. In Vigo County it was common from 1886 to 1891 and has so increased in abundance since then as to have become a serious pest.

In 1899 when our field work began at Lake Maxinkuckee the Striped Gopher was rare in that region; in fact, only one or two pairs were seen during that season. They had their home at the gravel pit and were observed most frequently in August. In 1900 they were more numerous. Besides the colony at the gravel pit, one or more were seen occasionally further south along the railroad, several about the sandy hills southeast of the lake, and now and then one was noted on Long Point. In 1904 they had still further increased.

On July 3 one was found dead on the railroad near Murray's where it had evidently been killed by a passing train. One or more were seen on Long Point, and in the autumn of 1906 several were observed there. In 1907, soon after corn-planting, these little rodents were found to have increased greatly in numbers about the gravel pit. They became very destructive to the young corn in a field nearby. They would pull up and eat the young plants. One individual was seen to pull up 20 stalks. The owner of the field shot 20 of them in May and early June. Many of them were old ones while others were small and apparently young of the year. The gophers of this colony had their holes or burrows in and about the gravel pit. The colonies on the sandy farms south and southeast of the lake had also increased considerably in numbers, as had also that on Long Point. One was caught by a cat on Long Point in June of that year. In 1910 it was learned that they were becoming more and more abundant every year. Several were seen on Long Point. On the farms south, southwest and southeast of the lake they are getting to be a pest. They are probably now found west, north and east of the lake in suitable situations, but we have not observed them there, as our field work has not recently extended into those regions.

The Striped Gopher feeds upon young corn, wheat, oats, grass and other tender plants, also upon grain and other seeds of various kinds. It is very prolific and, once it has secured a foothold in any locality, it is quite certain to become a serious pest sooner or later unless drastic measures are taken to hold its numbers in check.

9. Marmota monax (Linnæus).

Groundhog.

The Woodchuck, Marmot or Groundhog as it is usually called in Indiana, is fairly common in most parts of the state. It most delights in the more hilly districts covered with open forests or grassy meadows, particularly those near fields of red clover. It is not rare about Maxinkuckee. One or more pairs can usually be found on the hillsides about Lost Lake, others in or at the edges of the fields along the Outlet, several north and east of the lake, and a few in most other suitable situations. In 1900 one had its

home in a burrow under one of the buildings on Long Point. In the fall of 1904 some burrows were observed in the middle of a level field, the holes going vertically downward several feet. This is rather unusual, as the Groundhog almost invariably selects a hillside or bank in which to dig its burrow.

In May and early June, 1901, five were shot in Green's field near the gravel pit, 2 of which were old females, and 3 were young. About the last of June, 1901, a half-grown young was caught near Lost Lake. When pursued it ran until overtaken, when it turned and showed fight. August 25, 1906, several were noted in fields near the railroad south of the lake. They sat up erect and watched us go by. September 13, 1906, one was killed near Lost Lake. September 22, 1907, several burrows, evidently of this animal, were seen along fences between the lake and the tamarack swamp.

In the early spring, soon after the first warm days have come and the only remaining reminders of the passing winter are a few snow banks in protected places or occasional little flurries of snow, and when the first green blades of grass are just peeping through the matted dead grass of the previous year on warm hillsides and along fence-rows, the first Groundhog of the season is apt to be seen. He will most likely be found out in the open in some old meadow, preferably a clover-field, and near his den. Here he appears early in the afternoon when the sun shines warm on the hillside. He comes out not only to feed upon the young and tender stems and leaves of the clover and other early spring plants, but he also delights to lie in the warm sunshine or to sit upright near his burrow looking about over the fields and renewing his acquaintance with the scenes which have remained only as a memory since he went into winter-quarters the previous fall. Later in the spring and in summer and fall, if you should be abroad in the early morning when the sun is just showing and the dew still hangs heavy and sparkling on the tender new grass, you will almost certainly be rewarded by seeing one or more Woodchucks in any cloverfield you chance to pass. Then they come out for their morning repast of red clover stems and leaves, and the tender shoots of windflower and cinnamon fern. At this time they will be quite busy. When done feeding they return to their burrows where they probably sleep until one or two o'clock when they reappear, not so much for feeding as

to bask in the warm sun or to look about over the country. Again late in the evening, between sundown and dusk, they come out again to feed. Then they usually remain out until nearly dark when they are apt to retire to their burrows. They are, however, to some extent nocturnal and may remain abroad well into the night.

The Groundhog is a pretty strict vegetarian, his food consisting chiefly of red clover and the tender stems of grasses and other plants. He will sometimes do damage to the young corn plants and will, on occasion, feed upon the leaves of pumpkin, squash and bean vines. They will sometimes visit the kitchen garden and do more or less damage to the cabbage heads and celery. They have also been known to visit apple orchards near their burrows and feed upon such fruit as they could find on the ground. The only real damage they do that is serious is that done to the clover-field; all the rest is only occasional and may be regarded as negligible, except perhaps the inconvenience caused by the holes they make in the meadows and fields.

Dr. Merriam has observed[1] that in the fall the Woodchucks tend to leave the burrows in the open fields and go to those in the woods in which they spend the period of hibernation, and our observations lead us to the same conclusion. Certain burrows in Walley's and other woods which appeared to be deserted during the summer showed evidences of being used early in the fall and those in the fields had the appearance of having been abandoned in September or early October.

On May 3, one was observed sitting at the mouth of his burrow which was under a large stump. One of us slipped up from the opposite side, and, looking over the stump, watched him for sometime at very close range. He was very quiet and seemed to be looking out across the field. When a small object was dropped upon his nose he quickly turned his head sidewise and looked up with an expression of curiosity, if not astonishment, on his face. Not until the observer moved did he become frightened, when he quickly disappeared in the burrow.

The Woodchuck produces 3 to 6 young in a litter, usually about the last of April. We have some evidence indicating that two

[1] Mammals of the Adirondacks, p. 241.

litters may be produced in one season. On September 10 a young Woodchuck not more than one-third grown was seen on an open hillside where it was feeding on fresh grass. When chased it ran quite swiftly. When overtaken it would change its course from time to time. Finally when tired out it crouched down in the grass, apparently attempting to hide from its pursuers. Its small size suggested that it was born not earlier than the middle of July or later.

The Groundhog as yet possesses little or no economic value. Its pelage is coarse and contains little fur. The hide is tough and ought to make a good quality of leather. The flesh is abundant in quantity, sweet, palatable and very nutritious; it ought to be more extensively utilized as an article of food.

10. Sciuropterus volans (Linnæus).

Flying Squirrel.

Wherever there are, about the lake, large old trees with hollow trunks or limbs, one or more pairs of Flying Squirrels are likely to be found. Striking such trees with an axe or maul will often induce the squirrels to come out, especially if the tree is of proper size and springy enough to vibrate well in response to blows. When striking the tree is stopped, the squirrels usually return quickly to their nest. By such devices as this, one is apt to discover that the Flying Squirrel is a much more common animal in the neighborhood than the number seen otherwise would indicate. On account of its quiet, unobtrusive ways and its nocturnal habits it is not often seen except by those who know its ways.

These squirrels usually make their nests in holes in old dead or decaying trees; they may utilize a hollow limb, a decayed and hollowed-out portion of the trunk or a deserted woodpecker hole. Late in the fall, after the cottagers have left the lake and the cottages have been closed for the winter, these resourceful little animals sometimes take up their residence in the loft, cupboard or some suitable box in the cottages. There they build their nests and dwell cosily until the warm days of returning spring tempt them to return to a hole in some scraggy old oak near-by, where they will spend the summer.

Occasionally, in the evening twilight or on moonlight nights, a Flying Squirrel may be seen sailing in a gentle downward curve from one tree to another, the start being made from well toward the top of one tree and the place of alighting at a much lower point on the other. There is something ghost-like in this gliding flight; it is so unlike that of any other of our native creatures; there is not only an entire absence of fluttering wings, but perfect silence.

While in their nests these squirrels do more or less squeaking. On the night of September 21, 1903, one or more were heard in trees in the Arlington hotel grounds. On November 27, 1904, the accidental burning of two cottages on Long Point ignited some of the surrounding trees, one of which contained a family of Flying Squirrels. They did not leave their nest until fatally burned when they leaped to the ground. On August 19, 1906, while riding along a road west of the lake a squeaking sound attracted attention to the base of a small scrub oak at the roadside. On examining the place four young Flying Squirrels were discovered. They were quite small and wholly naked. A storm had probably blown them from their nest which was a large, globular affair, made of fibrous material, situated in a crotch of the tree. While we were only a few feet away, one of the parent squirrels, presumably the mother, came down the tree and, taking the young in her mouth, carried them, one at a time, back to the nest.

On April 16, 1890, one of us found a nest containing two young Flying Squirrels, south of Terre Haute. The nest was in a woodpecker's hole about 20 feet from the ground in a maple. Upon striking the tree the mother squirrel came out of the hole and flew to another tree near-by, where she remained watching. Breaking the snag at the hole the two young were removed and placed on the ground. After a little time the old squirrel flew back to the snag and seemed much disturbed by the changed appearance of things. She looked all about and, finally discovering the young on the ground, she came down, and taking one in her mouth, carried it to the top of the snag from which she then flew with the young in her mouth to another tree about 30 feet away. She ran up that tree to a height of about 50 feet where she found a knot-hole in which she placed the little one. In a moment she reappeared and flew back to the snag for the other. In the meantime I had stationed myself

near the young. After several advances and retreats she finally came and seized the young in her mouth when I caught her in my hand. When released she returned to the knot-hole with the young squirrel. These dates (April 16 and August 19), are of interest in showing so wide a range in the breeding season of the Flying Squirrel.

On December 16, 1890, a family of six Flying Squirrels was found by Mr. J. M. Beck near Burlington. They were all full-grown. On Thanksgiving day, several years ago, Prof. U. O. Cox, then of Farmland, Indiana, found 15 Flying Squirrels in a small rotten stump a little higher than a man's head.

It is remarkable the number of Flying Squirrels that can be discovered in any wood by knocking on the old dead snags or trees, particularly in the spring. We have found them in old oaks, beeches, maples, ash, willows, sycamores and hickories, as well as in various old buildings. They seem to breed chiefly early in the spring, about sugar-making time. A second or third litter may be produced later in the season.

Flying Squirrels make very interesting pets. Several years ago one of us had two which were kept as pets for several weeks. They had the freedom of one room in the house. During the day they lay curled up in a box provided and made comfortable for that purpose. At night, particularly before midnight, they would come out to play about the room and to accept the nuts and other food offered them. One night a drawer containing a number of bird-skins was inadvertently left open. One of the squirrels got into it, ate one of the skins and as a result died of arsenic poisoning.

11. Castor canadensis carolinensis Rhoads.

Beaver.

The Beaver was at one time pretty common in the northern part of Indiana. There still exist vestiges of one or more beaver-dams in the outlet between Lost Lake and the Tippecanoe River.

12. Peromyscus leucopus noveboracensis (Fischer).
Common White-footed Mouse; Deer Mouse.

This is the common wild mouse of Indiana. At Maxinkuckee it is abundant not only in the fields and woods but also about the cottages around the lake. Any old pile of wood, boards, logs or brush, stack of straw or hay, or shock of fodder, is almost sure to contain at least one family of these beautiful and interesting little animals. They may also be found in almost any old dead tree whether in open woods or dense forest, in which there are natural hollows or deserted woodpecker holes.

Several examples were trapped in July at the cottage occupied by us on Long Point. A male was captured October 20, 1906, at the pond below Farrar's woods.

These mice feed largely upon beechnuts of which they often store up considerable quantities for winter use. We have on various occasions found more than a pint of beechnuts stored in a hole in some old tree, evidently by these mice. They do not hibernate, but remain quite active during even the most severe winters. Their tracks may be seen in abundance on the snow. They also feed on small snails and other small, delicate mollusks such as Physa, Limnæa and Sphærium. We have frequently found shells, with the apex bitten off, in and about the nests of these mice.

They breed probably several times each season, as we have seen young as early as March and as late as November. The number of young produced in a litter ranges from four to six. We have frequently caught old females with the young hanging to the teats and carried them many rods before the young dropped off.

On two occasions when one of us put a shrew (*Blarina brevicauda*) in a box with a Deer Mouse the shrew killed and ate the mouse.

The Deer Mouse is readily distinguished from related species. It attains a length of 6.5 inches including the tail which is 3 to 3.25 inches long. In color it is yellowish brown, grayish, or fawn-color; belly and feet pure white; tail less distinctly bicolor than in the Michigan White-footed Mouse.

13. Peromyscus maniculatus bairdi (Hoy & Kennicott).
Michigan White-footed Mouse.

This species is not as abundant as the Common White-footed Mouse. It does not appear to venture into woodlands or swamps, but seems to prefer dry, open situations such as the edges of fields and grassy pastures. Its general distribution is more northern than that of its near relative, *P. leucopus noveboracensis*. It is very abundant in the sand dunes that border Lake Michigan. At Maxinkuckee it is probably not uncommon, though we have seen only 3 examples. One was found dead on the railroad track November 3, 1904. Another captured at the gravel pit October 29, 1906, gave the following measurements: Length 118 mm.; tail 48; hind foot 9; ear 10; girth 55. A third example was captured November 3, 1906, in a cornfield east of the lake.

The young of this mouse differ from the adult in being drab in color instead of yellowish-brown. On one occasion when trapping these mice for specimens it was observed that they were quite seriously infested by fleas. The examples thus afflicted could usually be recognized at once by their having the hair gnawed or scratched out from about the root of the tail.

This mouse can be distinguished from its more common relative (the Common White-footed Mouse) by its smaller size, smaller ears and feet, and shorter tail, the tail being more thickly hairy and more sharply bicolor. The adult is yellowish-brown, with a sooty dorsal band; belly white; feet not quite white; tail bicolor. Length $4\frac{1}{3}$ inches, tail $1\frac{1}{2}$ inches.

14. Microtus pennsylvanicus (Ord).
Field Mouse; Meadow Mouse; Vole.

The Meadow Mouse is abundant in all suitable situations about the lake. The extensive areas of semi-marshy grassy land supply an ideal habitat for this noxious but interesting little animal. Wherever there are meadows or marsh ground covered with grasses there these mice will be found, their labyrinthine runways forming an intricate network under the dead grass where their nests are numerous and usually quite conspicuous. These runways are very

common in the low marshy meadows such as are usually submerged during the winter and spring, during which time the mice must retreat to higher ground. They do not hibernate but continue very active throughout the winter. In the spring when the snow melts away their runways that were under it become quite conspicuous.

This species is very destructive to grasses and other cultivated crops. When the corn is cut and left in shocks in the field these mice establish themselves in nearly every shock, building a nest near the center and feeding destructively upon the corn. The amount of damage done in this way to the average field of corn is very considerable and far in excess of that done to the poultry yard by the hawks which, if not destroyed by the farmer, would do much to hold the Field Mice in check. The Marsh Hawk, Sparrow Hawk, Pigeon Hawk and Cooper's Hawk, as well as the various owls all prey on these mice.

On October 24, 1904, a Meadow Mouse was found on the lake shore, beheaded, possibly by some bird of prey. November 1, 1904, a cat was seen with one. December 11, 1904, one was seen near a muskrat house in Norris Inlet marsh.

15. Fiber zibethicus (Linnæus).

Muskrat.

The Muskrat is a familiar and well-known animal throughout North America wherever there are marshes, ponds or streams. Among the hundreds of small lakes and smaller ponds in northern Indiana there is probably not one that is not the home of one to several pairs of these interesting rodents. At and about Lake Maxinkuckee it is quite common, albeit not often seen except by the few elect who know when and where to look for it. In the autumn and early winter, especially in the evening and early morning, they may be seen swimming about or heard splashing among the weeds near shore. It is at this time that they begin to build their houses, and day by day those who pass along the shores of the lakes or about the ponds and marshes may notice the increase in size of the piles of Chara and rushes of which they build their winter homes. These homes or houses are built almost anywhere along the shore in shallow water or even well out in small

shallow ponds wherever there is suitable building material conveniently at hand. Every Scirpus patch is likely to contain one or more of these houses. On the west side of the lake we usually found one in a small pond by the side of the railroad just north of the Assembly grounds, two or three in the edge of the lake between there and Culver, one near the Winfield cottage, one or more in Outlet Bay, two or three between Long Point and Murray's, six or more from Murray's to Norris Inlet, a score or more about Norris Inlet, several along Aubeenaubee Creek and perhaps a dozen in the northeast corner of the lake and along Culver Creek. A great many are seen each year about Lost Lake and along the Outlet throughout its entire length, even to Tippecanoe River. Each of the marshes and ponds west of the lake has its share of nests and each old kettle hole that is not too dry will have one or more.

While these are the usual places where the muskrats build their houses, now and then a house is found in some quite unusual and unexpected place. Among these are the cross-timbers under the piers at the cottages about the lake. December 24, 1900, a completed nest was found resting cosily on cross-timbers under the pier at the Lakeview Hotel. Though not large this nest was compactly built. It was composed almost wholly of Chara and was a foot or more above the surface of the water. November 2, 1904, another nest was found in a similar situaton on cross-timbers at the distal end of the Culver depot pier. This nest was quite large and composed chiefly of Chara. When disturbed the owners of these nests would drop quietly into the water and swim away.

Toward the last of October, 1904, a nest was found on the seat of an abandoned boat near Murray's. This nest was newly built and consisted chiefly of Chara and Scirpus stems. Later, when the lake froze over it was deserted. Still another nest was found on the top of a tree that had fallen into the lake, and yet another on the boughs of a broken tree that extended into the water.

The most interesting and unique situation selected by a muskrat for its house ever seen by us was a large dry-goods box which a duck-hunter had anchored in Outlet Bay for use as a blind from which to shoot ducks. The box was anchored some distance from shore with the open side toward the shore. Bushes with leaves still on were stuck in the lake about the box to aid in concealing

the gunner and his boat, a half-inch manila rope being used to hold the box at anchor. On visiting the blind one morning in October more than a peck of fresh wet Chara was found in the box. The amount was increased each night for the next few days until it consisted of more than a bushel of material, almost wholly Chara. One morning the box was missing and the next day it was found on the east side of the lake where it had evidently been drifted by the wind. An examination of the anchor rope disclosed the fact that it had been gnawed in two by the Muskrat itself which thus set its own home adrift.

The materials which the Muskrat uses in constructing its winter houses are chiefly various aquatic plants such as Chara, water lilies (both white and yellow), Potamogeton, Myriophyllum, Ceratophyllum, Scirpus, Typha, Iris, and the like, and our observations lead us to believe that they utilize at least some of this material as food. Along with these various plants will often be found stems and sticks of various sizes. In Lost Lake some of the houses contain a considerable proportion of mud.

During the summer the muskrats appear to subsist almost wholly on vegetable matter. In the early fall they sometimes make foraging trips to nearby gardens where they commit depredations on the carrots, parsnips, beets, turnips and other succulent vegetables. They also eat the seeds as well as the stems and roots of the yellow and the white pond lilies. They gnaw the bark from the roots and stems of Swamp Loosestrife (*Decodon verticillatus*) and the Buttonbush (*Cephalanthus occidentalis*). Later in the fall and during the winter animal food enters more largely into their menu. We have found them feeding on dead coots and ducks that had drifted ashore or which, wounded by some gunner, had escaped among the weeds and sedges fringing the lake. They also feed on turtles of various species which they find dead or which they themselves may kill. On several occasions we have found partly devoured turtles under circumstances which left no doubt as to what had been feeding on them. December 11, 1904, several dead painted turtles and a few musk turtles were found near Norris Inlet lying on their backs on the snow or ice, with the flesh wholly or partly devoured, and Muskrat tracks leading to and from them and all about. The most important element of the winter food of

the Muskrat, however, is the freshwater mussels or Unionidæ. At various places along the shore, wherever an object projects out into the water, such as a log or pier, or fallen tree-top, there will be found in autumn or early winter a pile of mussel shells where muskrats have been feeding. These piles are frequently of considerable size, containing sometimes a bushel or more of shells. September 24, 1907, one of these piles on Long Point was examined. It was off shore several feet and in water 18 inches deep. About one-half of the shells were examined critically and counted. There were 532 shells, representing 4 species as follows: *Lampsilis luteolus*, 358; *Unio gibbosus*, 167; *L. iris* 6; and *L. multiradiatus*, 1.

During the fall these operations are probably confined to mussels which they find in shallow water near shore. In winter, however, when ice-cracks form and extend well across the lake, the Muskrats go far out on the ice, dive through the cracks and bring up mussels which they eat sitting on the ice. At such times they get mussels at considerable distances from shore. In the first days of January, 1905, a broad crack formed in the ice from Long Point to the Norris boat-house. On January 4, a Muskrat was seen at the edge of this crack about 1000 feet from shore eating mussels. It would dive through the crack and after a little while reappear with a mussel. Sometimes it dived 5 or 6 times before securing one. It would then sit up on its haunches, holding the mussel in its paws and, by much clawing and chewing, finally succeed in opening the shell and removing the meat, which it usually licked out quite clean. In some cases the muskrat failed to get the shell open. Usually the shells are but little or not at all broken; even the hinge still holds and the shells are scarcely injured. It is our observation that the Muskrat, by inserting its claws or teeth between the valves succeeds in cutting or tearing loose the adductor muscles so as to permit the valves to spring open. Another Muskrat was observed further out on the same crack, a long distance from shore, and the ice along the crack between the two was pretty thickly strewn with shells. The Muskrats apparently do not care so much for mussel gills filled with eggs or glochidia, as these were usually rejected. The stomach of a Muskrat examined at Washington, D. C., late in the spring was found well-filled with mussel remains. Muskrats also feed to a considerable extent on fish, crawfish and frogs. We

have on more than one occasion found partly devoured fish at their feeding stations, and remains of fish, frogs and crustaceans in their kitchenmiddens. We have never seen a Muskrat catch a live fish, but have no doubt they do so. They certainly pick up freshly dead fish which they chance to find.

At Lake Maxinkuckee the Muskrats raise at least two litters, and probably three, each season. About the middle of June, 1901, young muskrats about half-grown were seen swimming about or sitting on their haunches on shore eating bits of lily roots. These were probably of the first litter. On June 15, 1903, a nest with 5 young was found in a pile of brush on marshy ground on Long Point. The young were evidently not more than a few days old, as their eyes were not yet open. On May 31, 1901, we caught one about one-third or one-half grown on south shore of lake. September 5, 1906, saw 2 young not more than half grown. On another occasion, a young one was seen on the shore near the Culver depot pier and was almost caught before it took alarm. On another occasion, a young one was seen to dive in shallow water south of Green's pier. Upon wading out to where it dived a hole was seen in the bottom, out of which the Muskrat soon came and was captured. From these data it is evident that at least 2 litters per season are raised in this vicinity.

In the early winter, after ice has formed some distance out from shore, Muskrats are often seen swimming under the ice. They move along quite rapidly, and present a peculiar appearance, a bubble of air at each nostril expanding and contracting as they breathe, and a number of small bubbles on the fur giving them a silvery color. Apparently the Muskrat before diving fills its lungs with air, portions of which it exhales and rebreathes again. During the time it remains as a bubble at each nostril it is purified through its contact with the water and rendered fit for breathing again. This peculiar habit would seem to account for the ability of the Muskrat to remain under water so long. On one occasion (in December, 1904) when standing on the ice a peculiar sound was heard beneath our feet. Upon investigation it was found to be caused by a Muskrat gnawing at the under side of the ice. The sound was like that made by a rat gnawing under a floor.

At times the Muskrats make various noises. September 5, 1906, two half-grown young were observed chasing each other and singing a long, shivering note, followed by mewings and squeakings and other noises or calls. The shivering, singing noise was heard on other occasions.

The Muskrat is the most valuable fur-bearing animal in the Maxinkuckee region; indeed, it is the most valuable in the state. Considerable numbers are trapped each year about the lake, the best grounds being Norris Inlet and Lost Lake together with the Outlet. We have been unable to obtain complete figures of the catch, but have enough to show that it is important. In the winter of 1896–1897 one trapper secured between 60 and 70 skins. One who trapped only at Norris Inlet in the fall of 1900 had secured 30 pelts by November 9, and another at Lost Lake had 50 by the same date. Up to November first, 1903, two men trapping chiefly at Norris Inlet had secured 103 pelts. They got 28 one night. Their entire catch for the winter was 264 Muskrats, 4 Mink and 3 Opossums. The Muskrat pelts brought them 10 to 15 cents each. The prices now are much higher, ranging from 30 to 50 cents. Black pelts, which constitute a small proportion of the catch, bring much higher prices.

It has long been suspected that the Muskrat is the intermediate host of certain parasites which are concerned in the production of pearls in the Unionidæ or freshwater mussels. The Muskrat stomachs and intestines examined by us at Lake Maxinkuckee did not enable us to demonstrate the truth of this theory. One stomach examined contained no parasites of any kind. Another examined at Washington, D. C., contained a few parasites but none that could be identified with the distomid which induces pearl-formation. A species of parasite, *Monostomum affine* Leidy, closely related to the distomids was described from the gall-bladder of the Muskrat. It is the intention to examine a considerable number of stomachs at the first opportunity with a view to determining the facts in this matter.

16. Zapus hudsonius (Zimmermann).
Jumping Mouse.

This is another northern animal whose range southward reaches northern Indiana. It is frequently reported from this part of the state, particularly from the vicinity of Yellow River. It is also said to be seen occasionally about Rochester a few miles southeast of the lake. Our only definite record for the lake is of one found dead near the ice houses on the west side of the lake August 26, 1906. This example gave the following measurements: length of body, 80 mm.; tail 108 mm.; ear 5 mm.; hind foot 28 mm.

Erethizon dorsatum (Linnæus).
Porcupine.

According to accounts given by old settlers in Indiana, the Porcupine was at one time not rare throughout the northern part of the state. It was not uncommon for the inquisitive cow or the dog to come home with its nose full of spines of the Porcupine. It was the custom to hold the afflicted animal and pull out the spines with pincers, as they stuck very tightly, while the suffering creature announced to the neighborhood the discovery it had made that day. Troubles like this caused the settlers to wage a war of extermination on the Porcupine, with the result that it is now rarely or never seen. We have only one record of its recent occurrence in this vicinity. According to Mr. S. S. Chadwick one was killed a short distance west of Culver in the fall of 1887.

18. Sylvilagus floridanus mearnsi (Allen).
Rabbit.

The Rabbit or Cottontail is an abundant and well known animal of the Maxinkuckee region. The large areas of uncultivated swampland, abounding in tall grasses, sedges and small brushy shrubs, the tamarack and other swamps, and the considerable tracts of timber, often with heavy undergrowth, give a wide choice of location and refuge. In all these Rabbits are usually quite abundant. Although apt to be found almost anywhere, there are choice places where it

is particularly common. Among these are the thickets, fields, and Farrar's woods at the south end of the lake; the shores of Lost Lake and the woods and fields from Green's to Walley's and beyond; the fields, swamps and prairie westward to Manitou and Houghton lakes, including the tamarack swamp; and the low ground along Aubeenaubee Creek on the east side.

The following records made by us serve to indicate to some extent the abundance of Rabbits in this region. They are by no means complete, but simply show the observations of one or two persons for portions of each of several years. During the fall of 1899 up to January 21, one man who hunted only occasionally and only in the immediate vicinity of the lake, killed 76 Rabbits. In 1901 they were said to be plentiful in February and on December 10, one hunter shot 19. On January 2, 1903, hunters obtained 21 in the vicinity of Mud Lake near the head of Aubeenaubee Creek; December 14, 4 hunters got 20 and on December 30, one got 8. In 1904, 7 were killed December 8, 24 on December 13, and 2 on December 22. In 1905 two were gotton November 27. In 1906, two on January 22, one seen July 21 and 29, and October 9, several on October 31 on the east side, 2 on November 13, one on the 14th and 4 gotten on the 20th. In 1907, a half-grown young was seen September 11 and another September 20; another not more than one-third grown was seen September 22.

In this region the Rabbit is hunted rather persistently every fall and winter from October to February and the total number killed is great; nevertheless the animals are so prolific that the supply usually keeps up pretty well. During some years it is less abundant. The season of 1908–9 was a period of scarcity. Generally these periods last only for a single season, and the next season is one of usual abundance. They are in best condition in November to January and these are the principal months when they are hunted. Unfortunately a few local pothunters have been using ferrets, a method which affords no sport, is entirely unsportsmanlike, gives the Rabbit no chance, and which cannot be too severely condemned.

In this region the Rabbit breeds at least twice each season. The first litter is produced early in the spring, usually in May, and the young are half or two-thirds grown by the first or middle of July. The second litter is probably produced in July or even as late as

September, as we have seen half-grown and one-third-grown young September 11 and 22. Heavy rains in the spring frequently flood the breeding grounds with the result that many of the first litters are drowned. This was particularly the case in 1902 when there were unusually heavy rains in May and June, flooding all the lowlands. That many young Rabbits were drowned is evidenced by their scarcity in the fall and winter following.

Here, as elsewhere, the Rabbit causes some damage to young fruit trees by gnawing the bark. The damage is greatest during the winters of heavy and long-continued snows which cover up other vegetation on which they would feed. The Lake Maxinkuckee region, however, is not much given to orchards or horticulture and the injury wrought by Rabbits is therefore not serious.

The Rabbit as an article of food is becoming more highly appreciated in recent years and there is also an increasing market for its fur. With proper laws providing adequate protection a large and valuable catch could be made every year.

19. Lynx ruffus (Gueldenstaedt).

Wild Cat.

The Wild Cat or Lynx was probably not uncommon in this county up to about 1850. They are now rarely seen. We have unauthenticated accounts of their occurrence west of Lake Maxinkuckee as late as 1870, or later. Dr. Hahn records the killing of one near Oxford, Benton County, in 1905.

20. Vulpes fulvus (Desmarest).

Red Fox.

Formerly common throughout the state but now not often seen. A few burrows believed to be those of Foxes were observed in Walley's woods and near the outlet, southwest of the lake. The only Foxes actually seen by us about the lake were a family of 3 young and their mother found April 18, 1901, in a den in Green's field southwest of the lake. The old one was shot, and the three young taken as pets. One of them promptly escaped, but the other two were kept for several weeks when a second one escaped. The

remaining one for some unknown reason became paralyzed in its hind legs. It was permitted to go about as best it could, and finally took up its residence among the bushes in Green's marsh. Here the dog would occasionally go to tease it, but the young fox was always able to keep the dog off. Late in the summer it disappeared and was not seen again.

21. Canis occidentalis Richardson.
Timber Wolf.

The Timber Wolf or Big Gray Wolf was doubtless very abundant throughout the wooded portion of Indiana in the early days. It still occurs in some numbers in the more wild regions. Mr. Anton Meyer tells us that he got a few pelts each winter up to 1905–6, from the region northwest of Plymouth toward the Kankakee marshes. During a visit to Starke County in 1906 we heard statements to the effect that large wolves are occasionally seen and heard in the vicinity of Knox. Dr. Hahn in his Mammals of the Kankakee Valley states that the reports of the occurrence of the Timber Wolf in that region are conflicting and that it may be that only the Prairie Wolf is found there. Mr. Meyer, however, states positively that he gets pelts of two different species, a "large gray timber wolf" and a "smaller prairie wolf."

22. Canis latrans Say.
Prairie Wolf.

The Prairie Wolf, or Coyote as it is more commonly known in the west where it is abundant, is not known to occur in the immediate vicinity of Lake Maxinkuckee. It is a species of the prairies, occurring in some abundance in the prairie counties in the northwest corner of the state, particularly in Benton, Lake, Newton, Jasper and Starke counties. Dr. Hahn[1] records a large number from these counties. He also states that a pack of moderate size was seen near Leesburg, Kosciusko County, in the winter of 1906–7.

[1] The Mammals of Indiana, 33d Annual Report Dept. Geology and Natural History of Indiana, 1908, pp. 562–565.

Mr. Anton Meyer of Plymouth, Indiana, already quoted, informs us that he usually gets a few small prairie wolf pelts each winter, chiefly from Starke and Jasper counties. As the prairie of this portion of the state reaches Lake Maxinkuckee it is quite probable that this wolf occurs there. Dr. Hahn expresses the belief that the Coyote has doubtless increased greatly in numbers in recent years in the northwestern portion of the state and that its range is gradually extending eastward.

23. Lutra canadensis lataxina F. Cuvier.
Otter.

The Otter was formerly not uncommon in this region, but it is now very rare. One was caught on the Tippecanoe River just below Delong about 1895. Mr. Anton Meyer, a fur buyer of Plymouth, Ind., tells us that he gets 10 or 12 Otter skins each year, chiefly from the Tippecanoe and Yellow rivers.

24. Mephitis mesomelas avia Bangs.
Skunk.

The Skunk or Pole Cat is not common in this region but it is apparently becoming more frequent. We saw none in 1899 and 1900, but that the country was not wholly deprived of this interesting animal was on several occasions made evident by the presence of the well-known diagnostic odor.

On September 16, 1906, the mangled remains of one were found on the railroad track near the gravel pit; it had evidently been run over by a passing train. On September 20, 1907, a freshly skinned skunk was seen in the possession of a hunter at Culver. The skin was 22 inches long, and the tail 10 inches. The roots of the hairs show through the skin so that the skin looks black under the black parts and white under the white dorsal stripe.

The price of prime skunk pelts in this region has ranged from $1.00 to $1.75 during the last few years.

25. Taxidea americana (Boddært).

Badger.

Never more than very rare in Indiana and now probably extinct in this part of the state. In 1893, Mr. S. D. Steininger, then of La Grange County, reported that the Badger has been found in Elkhart, La Grange, Steuben, De Kalb, Noble and Kosciusko counties; that four had been caught in La Grange County within the last 10 years, the last in 1887; that 3 were caught in the northeast part of Elkhart County in 1888, and a black one in Noble County in 1880. Various old residents say that it was formerly found in Marshall County.

26. Lutreola vison lutreocephalus (Harlan).

Mink.

The Mink is not common in the immediate vicinity of Lake Maxinkuckee, but it is said to be more plentiful a few miles to the westward and along Yellow and Tippecanoe rivers. One was killed in February, 1898, near the Winfield cottage; others were obtained about the lake December 18, 1899, January 19, 1900, and November 9, 1900. On April 5, 1901, a skull of a female mink was picked up near Lost Lake. A few were trapped in the winter of 1903–4; 3 at Norris Inlet in October, and one at the ice-houses December 14. On December 17, 1901, a mink dragged 3 ducks from the ice on the lake to a hole under a stone wall on Long Point.

In the winter of 1906–7, a mink track was observed on the shore at the Shady Point cottage. The mink had gone south toward Murray's until opposite the gravel pit when it went out on the ice several rods to an open place where it evidently fed for a time, after which it returned on the ice to the shore and then followed on south along the lake shore nearly to Murray's where it was found under the edge of the ice and killed. It was in some respects an abnormal mink, the head and shoulders being unusually heavy, the body short and thick like that of a coon, and the color jet black. The pelt sold for $3.50.

On September 7, 1907, a very large mink was seen in Outlet Bay between Chadwick's Hotel and the north end of the icehouses. It was watched for some time and was evidently feeding. It would

dive and remain under a few seconds, then come up not far from where it went under. After remaining at the surface a minute or two, swimming and turning about in a narrow area, apparently eating what it had brought up, it would dive again. Often the entire length from nose to tip of tail could be seen just above the water surface. When it dived it humped its back, going under head first, the entire length of the tail (except the tip) which seemed to be quite long, often coming entirely out of the water.

After feeding for more than 20 minutes it swam to its burrow on shore near the steamer slip. What it was feeding on was not determined.

In July, 1907, Dr. J. T. Scovell found a family of young minks on the Tippecanoe River, below Delong. They were on a mass of drift in the stream. They were moving about on the drift from one part to another. As the boat approached, the two old minks swam out toward it, and as the boat floated by they made a wheezy noise which they continued until the boat was some distance below them when they returned to the drift, into which the young had disappeared.

27. Putorius noveboracensis Emmons.
Weasel.

The Weasel is generally common throughout Indiana. It is not rare about Lake Maxinkuckee, although it is not often seen.

August 3, 1899, one was found freshly dead at the edge of the lake near Green's pier. An adult male was killed August 19, 1901, on Long Point, where it had taken up a temporary residence under the floor of a tent. Another fine large example was found dead near the railroad, south of the lake, in December, 1904.

About July 15, 1902, Mr. S. S. Chadwick saw a weasel chasing a rabbit. The rabbit came out upon the road on Long Point, turned back toward the lake, and then ran south. Just then a Weasel came along on the rabbit's trail. When it reached the road and saw that it was being watched it stopped a moment, then, not at all frightened, started on after the rabbit. Losing the trail it came back and hunted about until it was recovered, then again followed it by scent just as a dog would. The rabbit appeared greatly frightened, its eyes popped and shining. The Weasel was very quick and alert.

28. Procyon lotor (Linnæus).

Raccoon.

The Raccoon appears to be somewhat common, especially in the large stretch of heavy woodland east of the lake. It also occurs west of the lake as well as north and south of it, as evidenced by its depredations in the cornfields at roasting-ear time, and, later in the year, by the piles of shells it leaves from its feasts on freshwater mussels, a habit it shares with the muskrat. In the spring of 1901 they were often heard at night,—a shivering call not unlike that of the screech-owl. In January, 1904, one was caught near Monterey and another was taken east of the lake in November. In 1906 one was seen on east side, October 30. On September 7, 1907, five young Coons about two-thirds grown were got from a tree on the east side. The old ones escaped. Five days later 3 others were caught.

Mr. S. S. Chadwick says that the largest coon he ever saw weighed 18 pounds; this was in Pennsylvania.

In the Delphi Journal was recently noted the capture of a coon near Russiaville, Howard County, Indiana, which weighed 34 pounds.

29. Blarina brevicauda (Say).

Mole Shrew.

On account of its nocturnal and underground habits the Mole Shrew is not often seen and is therefore not very well or generally known even to those living in localities in which it is really common. It is probably not uncommon about Lake Maxinkuckee. We have records of 12 specimens, of which 9 were found dead as follows: one in road south of Arlington, in August, 1899; one on lake shore October 20, 1900; one near Fort Wayne, October 1, 1906; one near Winona, October 2, 1906; one south of Arlington, October 9, 1906; one at icehouses, October 22, 1906; one on Long Point, October 29, 1906; one on Long Point, September 25, 1907; one in road on Long Point, October 13, 1907. One was caught in a trap on west side of lake, November 1, and another on Long Point, October 22, 1906. One was caught by a cat, October 3, 1906.

Special search would no doubt have enabled us to find many more specimens of this curious little creature.

The stomach of the one caught October 22, contained many parasites resembling tapeworms. The one found October 29, was lying at the edge of the water and was covered with leeches.

Why these little creatures are so often found dead is not well understood. It has been suggested that the fetid odor of this animal, particularly the male, causes it to be rejected by animals which would otherwise prey upon it, and that those found dead are individuals which have been caught by hawks or owls and dropped after discovering the disagreeable odor possessed by the little animal which the hawk or owl at first thought would prove a delicious titbit.

The carnivorous, bloodthirsty nature of the Mole Shrew has been noted by many observers. On two different occasions we put a Mole Shrew in a box with a white-footed mouse and in each case the shrew killed and ate the mouse. Others have recorded similar experiences. One observer records the fact that a Mole Shrew ate three times its own weight of meadow mice in 24 hours.

30. Scalops aquaticus machrinus (Rafinesque).

Common Mole.

The Mole is very common about this lake. Its burrows may be seen in all suitable places. The loose, sandy soil is particularly well adapted to their habits. They are usually abundant on Long Point, also along the railroad, in the fields and open woodlands about the lake, in the Academy grounds, and in fact in all situations in the country where the conditions are favorable. Their burrows are often seen along the railroad, and frequently they are seen to pass from one side of the track to the other, passing under the rails between the ties.

Several were caught during our stay at the lake. When a captive mole is released it does not attempt to escape by running away but at once begins to dig or burrow, and in an incredibly short time it has sunk into the ground and entirely disappeared.

The popular prejudice against the mole based on the belief that it is injurious to vegetation is entirely unjustified. Moles are insectivorous in their habits and do not eat garden plants or vegetables at all. The only possible harm they cause is the slight injury

they sometimes do to lawns by their burrows. This, however, is infinitesimal in comparison with the great good done by ridding the fields, gardens and lawns of noxious worms, insects and larvae.

31. Myotis lucifugus (Le Conte).
Little Brown Bat.

The Little Brown Bat is quite common about the lake. They first appear early in April and remain out at least until November. We have definite records of April 10, June 23, September 17, October 9, and November 1.

On still evenings from May to October, just as the twilight deepens and objects at a distance become indistinct, these little creatures come out from their hiding places and may be seen circling in and out among the cottages and trees, and now and then out over the lake in their search for food. Rarely are they seen before sundown, but on moonlit nights we have seen them out over the lake as late as eleven o'clock.

MAP
OF A PORTION OF
STAUNTON, VA.
SHOWING RELATION OF CAVED
AREA TO THE STRIKE AND
DIP OF LIMESTONES
BY
E. M. KINDLE AND P. V. ROUNDY
SCALE
0 100 200 300 400 500 FEET
DIP VERTICAL
N
40° T
48° T
45° T
50° T
45° T
SCHOOL HOUSE
ENGINE HOUSE
BALDWIN ST.
BICKLE ALLEY
TODD HOUSE
P.O.
AVENUE
STREET
FREDERICK STREET
STREET
CENTRAL
AUGUSTA
MAIN STREET
LEWIS
JOHNSON STREET
Creek
Lewis
45° T
45° T
T